

**Claims**

1. A pharmaceutical composition comprising a nucleic acid molecule of the short-chain dehydrogenase (SCAD) gene family or a polypeptide encoded thereby or a fragment or a variant of said nucleic acid molecule or said polypeptide or an effector of a nucleic acid molecule of the SCAD gene family or said polypeptide, e.g. an antibody, an aptamer or another receptor recognizing a nucleic acid molecule of the SCAD gene family or said polypeptide encoded thereby, preferably together with pharmaceutically acceptable carriers, diluents and/or adjuvants.
2. The composition of claim 1, wherein the nucleic acid molecule is a vertebrate or insect SCAD nucleic acid, particularly a nucleic acid encoding a Drosophila protein (GadFly Accession Number CG3842), an unnamed protein (SEQ ID NO: 1 and 2), a human CGI-82 protein (SEQ ID NO: 3 and 4), or or a human PAN2 protein (GenBank Accession Number NP\_065956 for the protein, NM\_020905 for the cDNA) or a fragment thereof or a variant thereof and/or a nucleic acid complementary thereto.
3. The composition of claim 1 or 2, wherein said nucleic acid molecule
- (a) hybridizes at 50°C in a solution containing 1 x SSC and 0.1 % SDS to a nucleic acid molecule as defined in claim 2 and/or a nucleic acid molecule which is complementary thereto;
  - (b) it is degenerate with respect to the nucleic acid molecule of (a)
  - (c) encodes a polypeptide which is at least 85%, preferably at least 90%, more preferably at least 95%, more preferably at least 98% and up to 99,6% identical to a SCAD polypeptide as defined in claim 2;

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(d) differs from the nucleic acid molecule of (a) to (c) by mutation and wherein said mutation causes an alteration, deletion, duplication or premature stop in the encoded polypeptide.

- 5      4.      The composition of any one of claims 1-3, wherein the nucleic acid molecule is a DNA molecule, particularly a cDNA or a genomic DNA.
- 10      5.      The composition of any one of claims 1-4, wherein said nucleic acid encodes a polypeptide contributing to regulating the energy homeostasis and/or the metabolism of triglycerides.
- 15      6.      The composition of any one of claims 1-5, wherein said nucleic acid molecule is a recombinant nucleic acid molecule.
- 15      7.      The composition of any one of claims 1-6, wherein the nucleic acid molecule is a vector, particularly an expression vector.
- 20      8.      The composition of any one of claims 1-5, wherein the polypeptide is a recombinant polypeptide.
- 20      9.      The composition of claim 8, wherein said recombinant polypeptide is a fusion polypeptide.
- 25      10.      The composition of any one of claims 1-7, wherein said nucleic acid molecule is selected from hybridization probes, primers and anti-sense oligonucleotides.
- 30      11.      The composition of any one of claims 1-10 which is a diagnostic composition.
- 30      12.      The composition of any one of claims 1-10 which is a therapeutic composition.

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13. The composition of any one of claims 1-12 for the manufacture of an agent for detecting and/or verifying, for the treatment, alleviation and/or prevention of an disorders, including metabolic diseases such as obesity and other body-weight regulation disorders as well as related disorders such as metabolic syndrome, eating disorder, cachexia, diabetes mellitus, hypertension, coronary heart disease, hypercholesterolemia, dyslipidemia, osteoarthritis and/or gallstones and others, in cells, cell masses, organs and/or subjects.
14. Use of a nucleic acid molecule of the SCAD gene family or a polypeptide encoded thereby or a fragment or a variant of said nucleic acid molecule or said polypeptide or an effector, e.g. an antibody, an aptamer or another receptor recognizing a nucleic acid molecule of the SCAD gene family or a polypeptide encoded thereby for controlling the function of a gene and/or a gene product which is influenced and/or modified by a SCAD homologous polypeptide.
15. Use of the nucleic acid molecule of the SCAD gene family or a polypeptide encoded thereby or a fragment or a variant of said nucleic acid molecule or said polypeptide or an efector, e.g. an antibody, an aptamer or another receptor recognizing a nucleic acid molecule of the SCAD gene family or a polypeptide encoded thereby for identifying substances capable of interacting with a SCAD homologous polypeptide.
16. A non-human transgenic animal exhibiting a modified expression of a SCAD homologous polypeptide.
17. The animal of claim 16, wherein the expression of the SCAD homologous polypeptide is increased and/or reduced.

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18. A recombinant host cell exhibiting a modified expression of a SCAD homologous polypeptide.

19. The cell of claim 18 which is a human cell.

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20. A method of identifying a (poly)peptide involved in the regulation of energy homeostasis and/or metabolism of triglycerides in a mammal comprising the steps of

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- (a) contacting a collection of (poly)peptides with a SCAD homologous polypeptide or a fragment thereof under conditions that allow binding of said (poly)peptides;
- (b) removing (poly)peptides which do not bind and
- (c) identifying (poly)peptides that bind to said SCAD homologous polypeptide.

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21. A method of screening for an agent which modulates the interaction of a SCAD homologous polypeptide with a binding target/agent, comprising the steps of

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- (a) incubating a mixture comprising
  - (aa) a SCAD homologous polypeptide, or a fragment thereof;
  - (ab) a binding target/agent of said SCAD homologous polypeptide or fragment thereof; and
  - (ac) a candidate agentunder conditions whereby said SCAD polypeptide or fragment thereof specifically binds to said binding target/agent at a reference affinity;
- (b) detecting the binding affinity of said SCAD polypeptide or fragment thereof to said binding target to determine an (candidate) agent-biased affinity; and
- (c) determining a difference between (candidate) agent-biased affinity and the reference affinity.

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22. A method of screening for an agent which modulates the activity of a SCAD homologous polypeptide, comprising the steps of

(a) incubating a mixture comprising

(aa) a SCAD homologous polypeptide or a fragment thereof;

and

(ab) a candidate agent

under conditions whereby said SCAD polypeptide fragment thereof has a reference activity;

(b) detecting the activity of said SCAD polypeptide or fragment thereof to determine an (candidate) agent-biased activity; and

(c) determining a difference between (candidate) agent-biased activity and reference activity.

23. A method of producing a composition comprising the (poly)peptide identified by the method of claim 20 or the agent identified by the method of claim 21 or 22 with a pharmaceutically acceptable carrier, diluent and/or adjuvant.

24. The method of claim 23 wherein said composition is a pharmaceutical composition for preventing, alleviating or treating of diseases and disorders, including metabolic diseases such as obesity and other body-weight regulation disorders as well as related disorders such as metabolic syndrome, eating disorder, cachexia, diabetes mellitus, hypertension, coronary heart disease, hypercholesterolemia, dyslipidemia, osteoarthritis and/or gallstones and other diseases and disorders.

25. Use of a (poly)peptide as identified by the method of claim 20 or of an agent as identified by the method of claim 21 or 22 for the preparation of a pharmaceutical composition for the treatment, alleviation and/or prevention of diseases and disorders, including metabolic diseases such as obesity and other body-weight regulation

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disorders as well as related disorders such as metabolic syndrome, eating disorder, cachexia, diabetes mellitus, hypertension, coronary heart disease, hypercholesterolemia, dyslipidemia, osteoarthritis, and/or gallstones and other diseases and disorders.

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26. Use of a nucleic acid molecule of the SCAD family or of a fragment thereof for the preparation of a non-human animal which over- or under-expresses the CG3842 homologous gene product.

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27. Kit comprising at least one of

- (a) a SCAD nucleic acid molecule or a fragment thereof;
- (b) a vector comprising the nucleic acid of (a);
- (c) a host cell comprising the nucleic acid of (a) or the vector of (b);
- (d) a polypeptide encoded by the nucleic acid of (a);
- (e) a fusion polypeptide encoded by the nucleic acid of (a);
- (f) an antibody, an aptamer or another receptor against the nucleic acid of (a) or the polypeptide of (d) or (e) and
- (g) an anti-sense oligonucleotide of the nucleic acid of (a).

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